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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/176,078	07/05/2011	George Liang	2010P26645US	3919

28524 7590 10/21/2013

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EXAMINER	
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ART UNIT	**PAPER NUMBER**
3745	

MAIL DATE	DELIVERY MODE
10/21/2013	PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte GEORGE LIANG and SANTIAGO R. SALAZAR

Appeal 2013-010592
Application 13/176,078
Technology Center 3700

Before MICHAEL C. ASTORINO, MICHELLE R. OSINSKI, and HYUN. J. JUNG, *Administrative Patent Judges*.

OSINSKI, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from a final rejection of claims 1-13, 16-18, and 20-23.[1] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

CLAIMED SUBJECT MATTER

Claims 1 and 9 are the independent claims on appeal. Claim 1 is reproduced below and is illustrative of the appealed subject matter.

> 1. A ring segment for a gas turbine engine comprising:
>
> a panel having a leading edge, a trailing edge, a first mating edge, a second mating edge, an outer side, and an inner side, wherein cooling fluid is provided to said outer side and said inner side defines at least a portion of a hot gas flow path through the gas turbine engine;
>
> a first mating edge cooling system within said panel that receives a portion of the cooling fluid provided to said outer side of said panel for cooling said panel at one of said first and second mating edges, said first mating edge cooling system comprising at least one first mating edge impingement chamber, each first mating edge impingement chamber including:
>
> at least one metering supply passage extending from said outer side of said panel to said first mating edge impingement chamber, wherein cooling fluid impinges on a surface of said panel defining said first mating edge impingement chamber as it flows into said first mating edge impingement chamber through said at least one metering supply passage; and
>
> at least one metering discharge passage that extends from said first mating edge impingement chamber to said one of said first and second mating edges

[1] Appellants identify the real party in interest as Siemens Energy, Inc. App. Br. 3.

> of said panel for discharging cooling fluid from said first mating edge impingement chamber, said at least one metering discharge passage having a diameter that is smaller than a diameter of said first mating edge impingement chamber to provide metering for cooling fluid being discharged from said first mating edge impingement chamber.

REJECTIONS[2]

Appellant seeks review of the following rejections:

(1) claims 1-4 under 35 U.S.C. § 102(b) as anticipated by Parker (US 7,284,954 B2, iss. Oct. 23, 2007) (Ans. 3-5);

(2) claims 5, 6, and 8 under 35 U.S.C. § 103(a) as unpatentable over Parker and Liang '108 (US 7,670,108 B2, iss. Mar. 2, 2010) (Ans. 6-7);

(3) claim 7 under 35 U.S.C. § 103(a) as unpatentable over Parker and Liang '955 (US 7,665,955 B2, iss. Feb. 23, 2010) (Ans. 9);

(4) claims 1-4, 7-13, 16-18, 20, and 23 under 35 U.S.C. § 103(a) as unpatentable over Liang '955 and Parker (Ans. 9-18);

(5) claims 5 and 6 under 35 U.S.C. § 103(a) as unpatentable over Liang '955, Parker, and Liang '108 (Ans. 19); and

(6) claims 21 and 22 under 35 U.S.C. § 103(a) as unpatentable over Liang '955, Parker, and Tomita (US 7,033,138 B2, iss. Apr. 25, 2006) (Ans. 21-22).

[2] The provisions of the America Invents Act ("AIA") relating to 35 U.S.C. §§ 102, 103 apply to applications having an effective filing date on or after March 16, 2013. The effective filing date of the instant application is July 5, 2011, so the rejections are based on the pre-AIA versions of these statutes.

ANALYSIS

Rejection (1)

The Examiner's rejection is predicated on finding that Parker's openings 32 are metering supply passages as recited in claim 1. Ans. 3-4. The Examiner reasoned that "[t]he openings of Parker have a limited size/cross section and allow as much cooling fluid which can fill the opening to pass through at any given time . . . [thereby] limit[ing] the amount of cooling fluid from the outer plenum which can pass through the opening and into the impingement chamber." *Id*. at 23. The Examiner further reasoned that "[t]he size of the openings relative to the 'chamber' does not undo the control and restriction of the fluid which occurs between the plenum and the opening." *Id*. at 24.

Appellants contend that Parker's openings 32 are not metering supply passages and point to page 10 of the Specification in support of their interpretation of the term "metering supply passage" as a passage that is capable of restricting the amount of cooling fluid that can pass through the cooling system. App. Br. 6-7. As amended, the last paragraph on page 10 of the Specification states that:

> [A]s the cooling fluid associated with the first and second mating edge cooling systems 72, 74 is metered twice, i.e., a first time at the metering supply passages 90, 92 and a second time at the metering discharge passages 98, 100 (since the diameters of the metering discharge passages 98, 100 are smaller than the diameters of the first and second mating edge impingement chambers 94, 96, see Figs. 2-4), amounts of cooling fluid provided to the first and second mating edge cooling systems 72, 74 are believed to be more accurately controlled.

Amendments to the Specification mailed March 1, 2013, p. 2. Appellants contend that since Parker's openings 32 "are the same size as the 'chamber'

that the openings (32) feed, a flow rate of the fluid passing therethrough is not controlled or restricted" by the openings. App. Br. 8. Rather, "a maximum amount of fluid capable of being held by the chambers is always allotted into the chambers by the openings (32)." Reply Br. 2.

We agree with Appellants that the Examiner has erred in finding that Parker discloses "at least one metering supply passage extending from said outer side of said panel to said first mating edge impingement chamber" in light of the Specification as it would be interpreted by one of ordinary skill in the art. Parker's openings 32 do not restrict the amount of cooling fluid entering the impingement chamber of the cooling system.

For the foregoing reasons, Appellants have shown error by the Examiner in finding that Parker discloses all of the limitations of claim 1, and we do not sustain the rejection of claim 1, and dependent claims 2-4 which depend therefrom, as anticipated by Parker.

Rejections (2) and (3)

Claims 5-8 depend directly or indirectly from claim 1. The Examiner's rejections under 35 U.S.C. § 103(a) of claims 5-8 rely on the Examiner's erroneous finding that Parker teaches at least one metering supply passage. Ans. 6-9. The Examiner has not explained how Liang '108, Liang '955, or an engineering expedient might cure this deficiency. Accordingly, for the reasons discussed *supra*, we do not sustain the Examiner's rejections, under 35 U.S.C. § 103(a), of: claims 5, 6, and 8 as unpatentable over Parker and Liang '108; and claim 7 as unpatentable over Parker and Liang '955.

Rejection (4)

Claims 1-4, 7-13, 16-18, and 20

The Examiner's rejection is predicated on finding that Liang '955's vortex channel feed holes 46 are metering supply passages as recited in claim 1. Ans. 10. The Examiner reasoned that "[t]he vortex channel feed holes [46] do restrict and control the amount of fluid from the plenum to the vortex cooling channel." *Id*. at 27. Appellants' contention that Liang '955's vortex channel feed holes 46 are not metering supply passages is not persuasive because it does not provide evidence or cogent reasoning as to why the Examiner's finding is incorrect. App. Br. 12.

The Examiner's rejection is also predicated on finding that Liang '955 discloses that "cooling fluid impinges on a surface of the panel defining the first mating edge impingement chamber as it flows into the first mating edge impingement chamber through the at least one metering supply passage." Ans. 10. The Examiner reasoned that "fluid would strike against the bottom wall of the vortex cooling channel prior to forming a vortex flow" or that "cooling fluid adjacent the far wall will flow radially inward and impinge on the bottom surface." *Id*. at 27-28 (citing Examiner-annotated Figure 3 of Liang '955).

Appellants contend that "cooling fluid entering the vortex channels (18) . . . would flow down the smooth curves of the sidewalls that define the vortex channels (18) . . . wherein there would be no striking of cooling fluid against a wall to provide impingement cooling thereof." App. Br. 13; *see also* Reply Br. 5-6. We recognize the language of claim 1 relating to "cooling fluid imping[ing] on a surface" to be a functional limitation. While features of an apparatus may be recited either structurally or functionally,

claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78 (Fed. Cir. 1997). "[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb Inc*., 909 F.2d 1464, 1468 (Fed. Cir. 1990). Therefore, as long as Liang '955's vortex channel feed holes 46 are capable of allowing cooling fluid to impinge on a surface defining the vortex channel 18, the feed hole satisfies the functional limitation. Because of the similarities between Appellants' metering supply passages (*see* Amendments to the Specification mailed November 28, 2012, p. 2 ("[t]he metering supply passages 90 . . . have circular cross sections and are located toward the first mating edge 36 . . . .")) and Liang '955's feed holes (*see* Liang '955, col. 4, ll. 42-44, 62-63 ("vortex channel feed hole **46** may feed cooling fluids to the vortex cooling channel **18** proximate to the upstream edge **42** of the outer plate **22**. . . . [and] [t]he vortex channel feed holes **46** may be circular . . . .")), the Examiner is on solid ground in finding that the recited functional limitation would also be present in Liang '955. As such, Appellants have the burden of establishing that the feature would not be present. *See Schreiber*, 128 F.3d at 1478 (once the Examiner finds that the prior art structure would be capable of performing all of the functions claimed, the burden shifts to the applicant to show that this is not the case). Claim 1 does not include specific parameters for flow rate, and Appellants do not provide evidence or persuasive reasoning as to why Liang '955's vortex channel feed holes 46 would not be *capable of* allowing at least some portion of cooling fluid to strike the bottom of the vortex cooling channel 18 as found by the Examiner under at least some flow conditions (e.g., high velocity flow).

The Examiner acknowledged that Liang '955 fails to teach that the diameters of the metering discharge passages are smaller than the diameters of the impingement chambers, but found that Parker teaches discharge passages having a smaller diameter than the impingement chamber. Ans. 10-11 (citing Examiner-annotated Figure 3 of Parker on page 6 of the Examiner's Answer). The Examiner concluded that:

> [i]t would have been obvious to one having ordinary skill in the art . . . to . . . make the discharge passages smaller in diameter than the impingement chamber as taught by Parker . . . to increase the metering of the fluid between the impingement cavity and the area downstream of the discharge passage.

Id. at 11-12.

Appellants contend that modifying Liang '955 as proposed by the Examiner "would change the princip[le] of operation of the cooling arrangement . . . by completely disrupting the precise layout of ring segment cooling components in *Liang* [']*955*." App. Br. 13; *see also* Reply Br. 7. The "principle of operation" referred to by Appellants relates to the "basic principles" under which the prior art device was designed to operate. *In re Ratti,* 270 F.2d 810, 813 (CCPA 1959). Under *In re Ratti*, "a change in the basic principles" refers to change that is fundamental in scope so as to relate to scientific or technical principles under which the invention is designed to operate. We are not persuaded that a "change in the basic principles" occurs by making Liang '955's exhaust orifices 48 smaller when Liang '955's device, even as modified by Parker, continues to exhaust cooling fluids.

For the foregoing reasons, Appellants have failed to show error by the Examiner in concluding that the subject matter of claim 1 is unpatentable over Liang '955 and Parker, and we sustain the rejection of claim 1 under 35 U.S.C. § 103(a) as unpatentable over Liang '955 and Parker.

Appellants do not present separate arguments for claims 2-4, 7-13, 16-18, and 20. App. Br. 14-15. Accordingly, for the same reasons discussed *supra*, we also sustain the rejection of claims 2-4, 7-13, 16-18, and 20 as unpatentable over Liang '955 and Parker.

Claim 23

The Examiner acknowledged that Liang '955, as modified by Parker, fails to teach that the diameters of the metering supply passages closer to the leading edge of the panel are larger than those closer to the trailing edge as recited in claim 23, but found that Liang '955 teaches "having different sized supply passages based on different heat loads." Ans. 18 (citing Liang '955, col. 2, ll. 9-16). The Examiner concluded that:

> [i]t would have been obvious to one having ordinary skill in the art . . . to modify the ring segment of Liang ['955] as modified by Parker by increasing the diameter of the supply passages near the leading edge to be larger than the supply passages near the trailing edge as an engineering expedient for the purpose of cooling the leading edge where the heat load may be larger.

Id. at 18-19.

Appellants contend that "[t]he Examiner's conclusion of obviousness is not supported by articulated reasoning or evidence and could only be based on hindsight using the Appellant[s'] own disclosure as a guide." App. Br. 15. The Examiner responded that:

> because the turbine ring segment is downstream of the combustor of the turbine engine and the leading edge is closer to the combustor, it experiences a higher temperature than the trailing edge. Therefore, one having ordinary skill in the art would recognize that the leading edge would require more cooling and sizing the supply passages with a greater diameter would provide more cooling fluid to the leading edge.

Ans. 29-30. We do not agree with Appellants' hindsight contention because Appellants' assertion fails to point out the error in the Examiner's stated rationale. *See* Ans. 18-19, 29-30.

For the foregoing reasons, Appellants have failed to show error by the Examiner in concluding that the subject matter of claim 23 is unpatentable over Liang '955 and Parker, and we sustain the rejection of claim 23 under 35 U.S.C. § 103(a) as unpatentable over Liang '955 and Parker.

Rejections (5) and (6)

Claims 5, 21, and 22

Appellants do not present separate arguments for the rejections of claims 5, 21, and 22. App. Br. 16-17. Accordingly, for the same reasons discussed *supra*, we also sustain the rejections, under 35 U.S.C. § 103(a), of: claim 5 as unpatentable over Liang '955, Parker, and Liang '108; and claims 21 and 22 as unpatentable over Liang '955, Parker, and Tomita.

Claim 6

The Examiner acknowledged that Liang '955, as modified by Parker and Liang '108, fails to teach that the diameters of the metering supply passages closer to the leading edge of the panel are larger than those closer to the trailing edge as recited in claim 6, but found that:

> It is well known in the art of shroud cooling that forming the supply passages with different sized diameters will create a pressure differential between the leading edge discharge fluid and the trailing edge discharge fluid. It is beneficial to have the leading edge have higher pressure so that the cooling fluid will flow downstream upon exiting through the discharge passages.

Ans. 20. The Examiner concluded that:

> it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the ring

> segment of Liang [']955 as modified by Parker and Liang [']108 by having the leading edge supply passages have a larger diameter than the trailing edge supply passages as an engineering expedient for the purpose of creating the desired pressure gradient.

Id.

Appellants contend that "the Examiner's reasoning . . . is flawed" because Appellants' "exemplary reasons for the metering supply passages of the leading edge cooling system being larger than the metering supply passages of the trailing edge cooling system . . . do not relate to cooling fluid flowing downstream upon exiting the discharge passages, as asserted by the Examiner." App. Br. 16-17.

Appellant's contention is unpersuasive because there is no requirement that an artisan's reasons for making modifications of the prior art be the same as that of the patent applicant for the purposes of an obviousness inquiry. *See* Ans. 30; *see also In re Kemps*, 97 F.3d 1427, 1430 (Fed. Cir. 1996) (citing *In re Dillon*, 919 F.2d 688, 693 (Fed. Cir. 1990) (en banc) (citation omitted) ("Although the motivation to combine here differs from that of the applicant, the motivation in the prior art to combine the references does not have to be identical to that of the applicant to establish obviousness.")); *see also In re Linter*, 458 F.2d 1013, 1016 (CCPA 1972) ("The fact that [A]ppellant uses [a claimed feature] for a different purpose does not alter the conclusion that its use in a prior art composition would be prima facie obvious from the purpose disclosed in the references.").

For the foregoing reasons, Appellants have failed to show error by the Examiner in concluding that the subject matter of claim 6 is unpatentable over Liang '955, Parker, and Liang '108, and we sustain the rejection of

claim 6 under 35 U.S.C. § 103(a) as unpatentable over Liang ’955, Parker, Liang ’108, and an engineering expedient.

DECISION

The Examiner’s rejections of: claims 1-4 under 35 U.S.C. § 102(b) as anticipated by Parker; and under 35 U.S.C. § 103(a), of: claims 5, 6, and 8 as unpatentable over Parker and Liang ‘108; and claim 7 as unpatentable over Parker and Liang ‘955 are REVERSED.

The Examiner’s rejections, under 35 U.S.C. § 103(a), of: claims 1-4, 7-13, 16-18, 20, and 23 as unpatentable over Liang ‘955 and Parker; claims 5 and 6 as unpatentable over Liang ‘955, Parker, and Liang ’108; and claims 21 and 22 as unpatentable over Liang ‘955, Parker, and Tomita are AFFIRMED.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

rvb